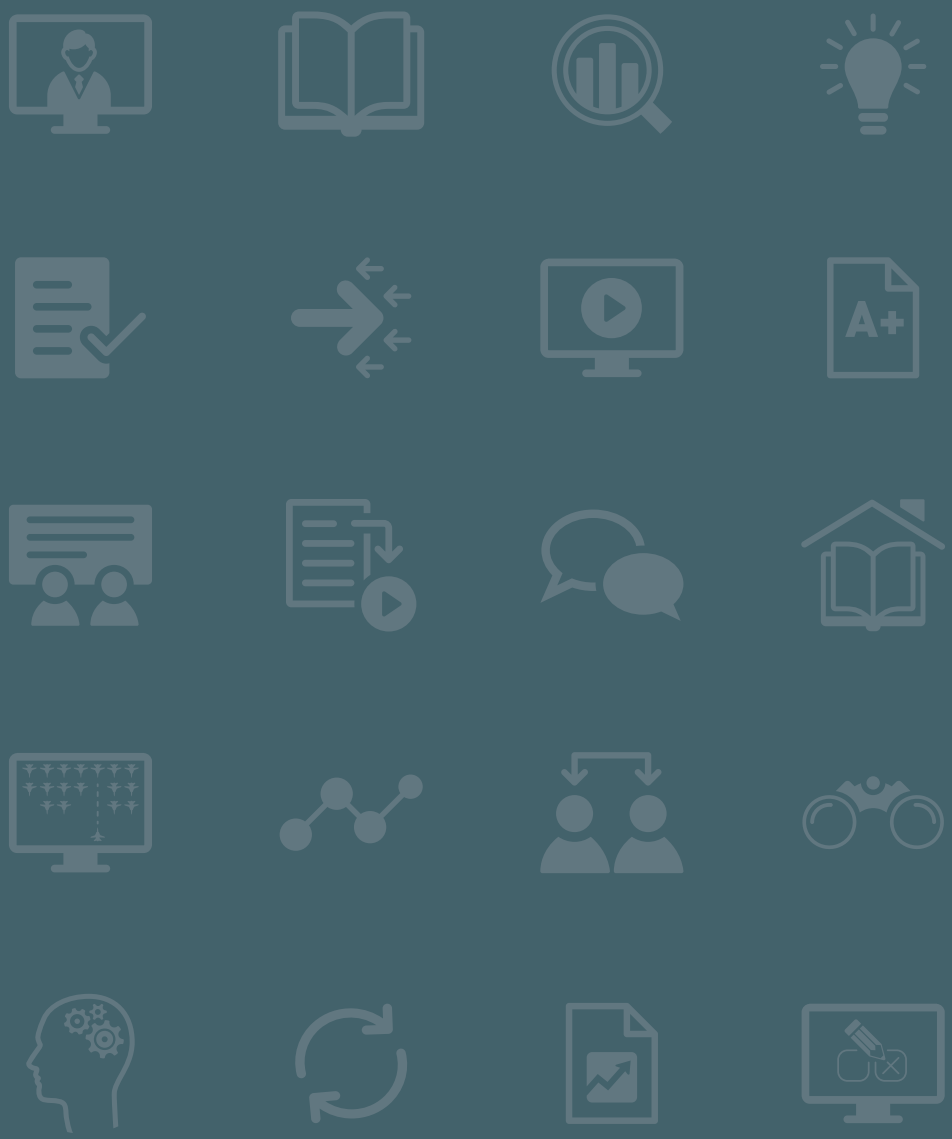
A NEW DIGITAL MODEL
for teachers and schools



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WHITE PAPER
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> In this sense, we are still waiting for the full benefit of computing technology in education and must remain suspicious of sales pitches. But this is not a reason to give up hope - despite billions of pounds of investment in IT, productivity improvements in business and retail took decades to arrive. But when they did... Well, you can download a good management book from Amazon and read all about them. In the meantime, proceed sceptically.

Russell Hobby, General Secretary of NAHT
16th January 2015

In the three years since EzyEducation started developing and marketing teacher-centric digital solutions, it has not been difficult to find evidence that Russell Hobby's advice to "proceed sceptically" has been taken on-board by teachers.

This can be explained by several factors:

1. Attempts to provide digital learning resources 'in-house', often via a VLE, have fallen flat. Teachers simply do not have the time nor the technical expertise to create and maintain digital resources to a high enough standard, in enough scope to cover entire syllabuses.

2. The quality of early-stage external solutions has been poor. Companies have rushed to provide digital resources for as wide a range of subjects as possible, at the expense of comprehensiveness. Teachers lack confidence that these services provide enough activities for their students to set meaningful activities. As a result, usage is low.

3. There has been a reluctance to explicitly incorporate digital services within schemes of work. They are viewed by some as opportunities for students to engage in independent work.

4. Early-stage digital solutions have failed to deliver a complete formative learning process. Summative assessment leaves teachers still in the hot-seat when it comes to explanations and feedback.

5. If multiple solutions are used and/or there is inconsistent usage within schools, data records are inconsistent and therefore do not effectively inform the teaching process.

Overall this has led to a sense of exasperation with digital solutions, and scepticism when another proposition pops up trying to market its wares.

This white paper will attempt to take a step back and look at three main areas:

- Why has the traditional teaching model reached its limits?

- What does a digital solution need to provide in order to make a difference?

  > Depth of Content
  > Feedback
  > Accessible Data

- How can adapting the teaching delivery model allow schools to get the most out of their digital solutions?

Why has the traditional teaching model reached its limits?

Allocation of Teacher Working Hours

SOURCE: 2013 TEACHERS WORKLOAD DIARY SURVEY - DFE

There is more pressure than ever on teachers to produce good grades. The advent of the Progress 8 measure, with its focus on 'added value', has placed a renewed academic spotlight on how exactly added value is achieved.

Improving learner outcomes arguably comes down to two factors under a teacher's control: increasing, firstly, the amount and, secondly, the effectiveness of learning activities. Both factors are severely hampered by the time pressures the teaching community are currently under.

Regardless of how motivated teachers are, the amount of marking they can handle is ultimately driven by how much time they have at their disposal and how many students they support. In the state system, the likelihood is that most students will receive less than 5 minutes of dedicated marking time each week from their teacher.

The DfE Teachers Workload Diary Survey (2013) indicated that 9.4 hours were available for marking each week (out of an average 56 hour working week!).

Weekly marking minutes per student

CLASS SIZE	NUMBER OF CLASSES 4	5	6
	28.2	22.6	18.8
	14.1	11.3	9.4
	9.4	7.5	6.3
	7.1	5.6	4.7
	5.6	4.5	3.8
	4.7	3.8	3.1

With some simple arithmetic, it is possible to work out what the consequences might be for individual students. Precise outcomes will depend on actual teaching loads - if a teacher supports 150 students (e.g. 6 classes of 25 students) there is only 3 mins 48 seconds of marking time each week available for each student (9.4 hours shared among 150 students). This covers the time it takes to read, conduct any verification marking and write comments to provide formative feedback and justify the mark awarded.

With such little time available, it is a pipe dream to suggest that it is possible, utilising traditional teaching methods, to increase the level of thoroughly marked work students complete and enjoy feedback from. Either the quality of marking and feedback suffers or teachers resign themselves to setting less work for their students to complete.

This pressure on teachers' time is unlikely to be alleviated anytime soon. In fact, the smart money is on it being exacerbated even further as the funding squeeze on the education sector continues to bite. The key is, then, to determine how digital solutions can increase both the quantity and effectiveness of learner activities without increasing the requirements on teachers. Now that would be a Eureka moment!

What does a digital solution need to provide in order to make a difference?

DEPTH OF CONTENT

Learning activities conducted digitally, which require no teacher input to conduct, clearly have lots of potential to increase the quantity of student activity, without increasing the burden on over-stretched teachers. However, for this potential to be realised, teachers must have trust that the digital solution they are using has consistently high quality resources, covering every single syllabus topic in depth

Many early-stage digital services targeted coverage over a wide range of subjects as their initial objective. In achieving this, teachers were left underwhelmed by the depth of content available for each individual subject. This is important. It breeds discontent with a digital service if teachers are unable to trust that they have access to a significant learning activity, regardless of topic they happen to be teaching that week. This leads to a reluctance to use the available digital platform as teachers know they will have to pad the activities out with their own content to ensure meaningful student activity. In which case, they might as well do it themselves.

Here at EzyEducation, we have deliberately taken a measured approach to course development. Our highest priority has been ensuring that each subject for which we provide a course has sufficient content depth. We want to develop teacher trust in the quality and quantity of our learning activities. When this is achieved, a digital platform can reach the nirvana of being consistently relied upon, either by inclusion with schemes of work or by becoming a reliable 'go-to' for setting work.

Activity hosted at Queen Elizabeth's Grammar School

	YEAR 13	YEAR 12 CLASS A	YEAR 12 CLASS B	TOTAL
Questions	51,165	25,786	13,623	**90,574**
Students	18	14	12	**44**
Average Questions per Student	2,842	1,841	1,135	**2,058**
Duration of usage	18 months	6 months	6 months	

EZY ECONOMICS

At this point, amazing things can be achieved. The usage statistics we see from some of our committed schools who have taken the service to the very heart of what they do are astounding.

The A Level economics teaching lead at Queen Elizabeth's Grammar School (a very early adopter of EzyEconomics) has used the digital solution to facilitate over 6,000 automated assessments over an 18-month period. This has been delivered by a single teacher. The automated approach has ensured that the 90,000 questions attempted by their 44 students have been automatically marked, with unique detailed feedback made available to students following each question. Each student has thus far answered an average of over 2,000 questions on the service. This level of assessment would put a huge amount of strain upon a teacher if they attempted to deliver it via a traditional approach.

FEEDBACK

Digital resources typically rely upon automated assessments as one of their main features. Automated assessment delivers two main benefits:

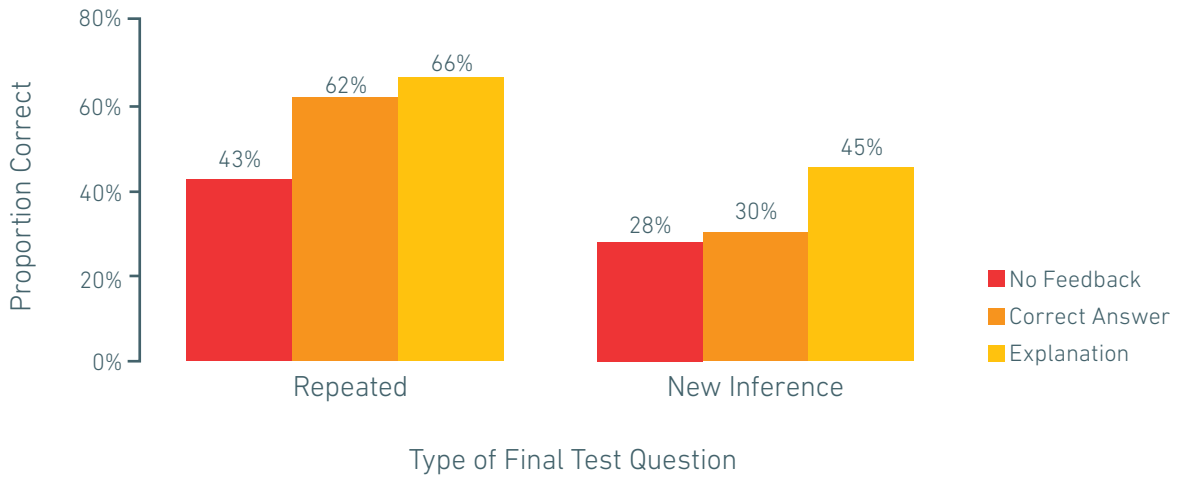
- Encourages student engagement and effort due to the accountability of assessment results.
- Creates data on student attainment.

However, most digital solutions provide only a summative assessment experience. As students work through an assessment they have access to 'correct answer' feedback only. When they cannot deliver the correct answer, students are told only that they are wrong and what the correct answer was. They are left to work out for themselves why they are wrong and how they should approach similar questions in the future.

Recent research (Butler, Godbole and Marsh - Explanation feedback is better than correct answer feedback for promoting transfer of learning - Journal of Educational Psychology 2013, Vol. 105, No. 298–290 ,2) has suggested that explanation feedback is significantly more effective than 'correct answer' feedback at improving student understanding.

They found that 'correct answer' feedback was effective when students were challenged to answer the exact same questions. However, students who received explanation feedback were significantly better at answering different questions on the same topic than those who received only 'correct answer' feedback.

Feedback that provides an explanation of answers achieves superior transfer of learning to new questions than feedback that simply identifies the correct answer



Proportions of correct responses on the final test as a function of feedback condition on the intial test and type of final test question in Experiment.

Here is how the research was carried out:

1. 60 university undergraduate students attended two test sessions.

2. In session 1, students were randomly assigned to three feedback conditions (no feedback, correct answer feedback and explanation feedback). The test consisted of 20 short-answer definition questions. Feedback was then provided regardless of whether the question was answered correctly or not and students were required to study the message for 20 seconds.

3. The students returned after 2 days for session 2 and answered 10 questions that were repeated and 10 new inference questions.

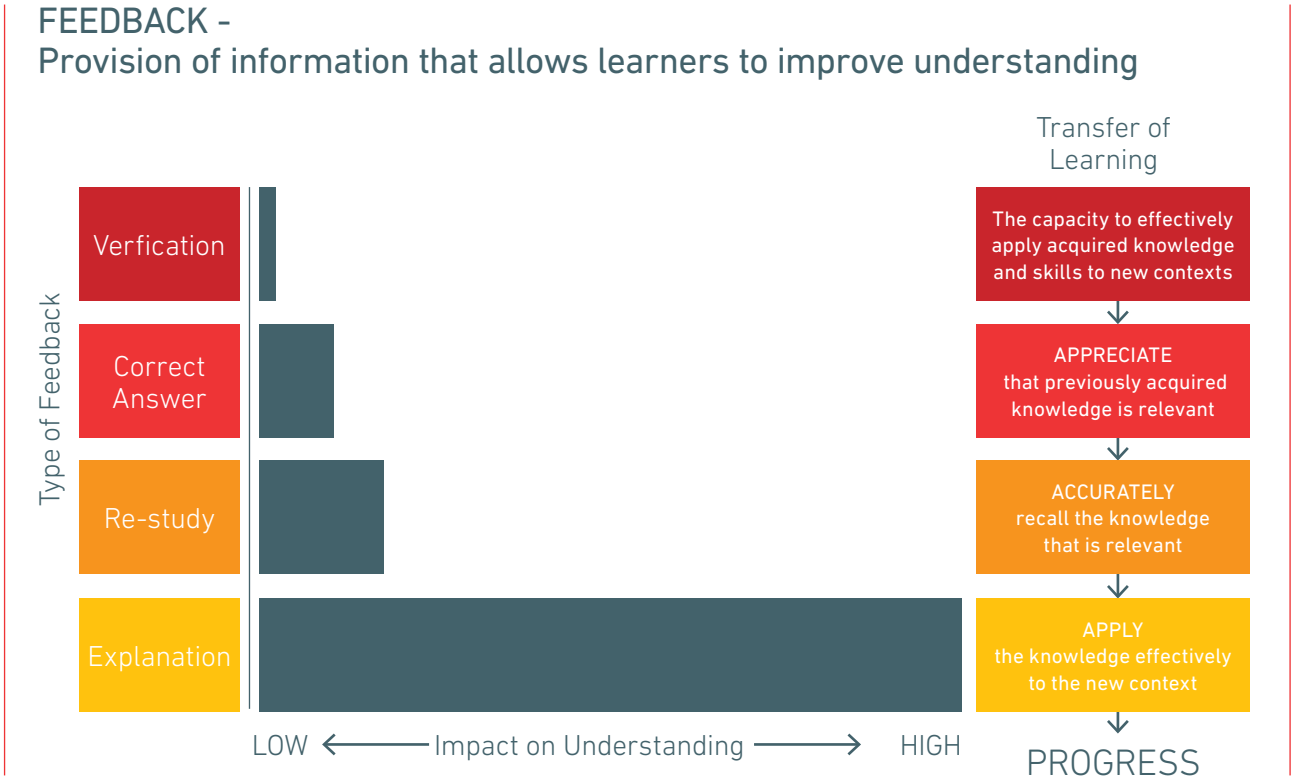
4. On the repeated questions both feedback conditions produced a better outcome (66% for explanation feedback and 62% for correct answer feedback) than the no feedback condition (43%).

5. On the new inference questions the explanation feedback condition produced the best coutcome (45%). Correct answer feedback (30%) did not significantly improve performance compared to no feedback (28%).

These outcomes are quite intuitive. If the questions are repeated, the type of feedback message provided is unlikely to have any significant impact:

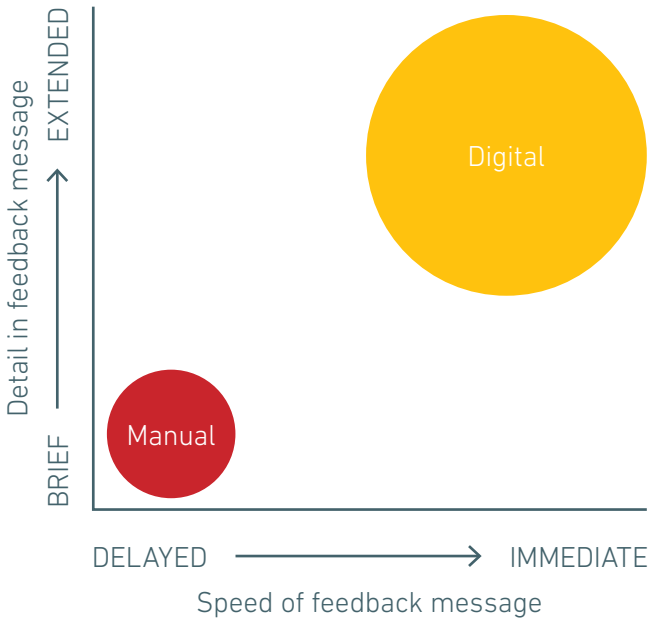
> If the learner only needs to remember the correct answer to perform well on the final test, then the additional information contained in elaborative feedback is superfluous. However, this additional information may be important for fostering better comprehension of the material. For example, providing an explanation of why a response is correct (i.e., explanation feedback) might help the learner to move from superficial factual knowledge to a more complex understanding of the concept. Thus, elaborative feedback might be expected to facilitate performance on a final test that assesses understanding rather than retention of the correct response. One hallmark of superior understanding is the ability to transfer knowledge to new contexts.

In the context of final examination performance, students are required to apply their knowledge and understanding to unseen questions and contexts. With this aim in mind, providing explanation feedback is clearly optimal. It allows a more effective transfer of learning to take place.



This provides an important message for digital solution providers – explanation feedback should be provided for all assessment tasks. Allowing students the opportunity to learn why their response was wrong provides a truly formative assessment experience.

ADVANTAGES OF AUTOMATED FEEDBACK
Provision of information that allows learners to improve understanding



- Feedback message composed once for all students
- Can contain a lot more detail
- Available on all questions
- Benefit is leveraged because efficiencies allow greater assessment activity
- Circle size is illustrative and shows the amount of feedback delivered
- Circle position illustrates the feedback message detail and speed of delivery
- Regardless of teaching effort it is impossible to compete with the efficiency automation achieves

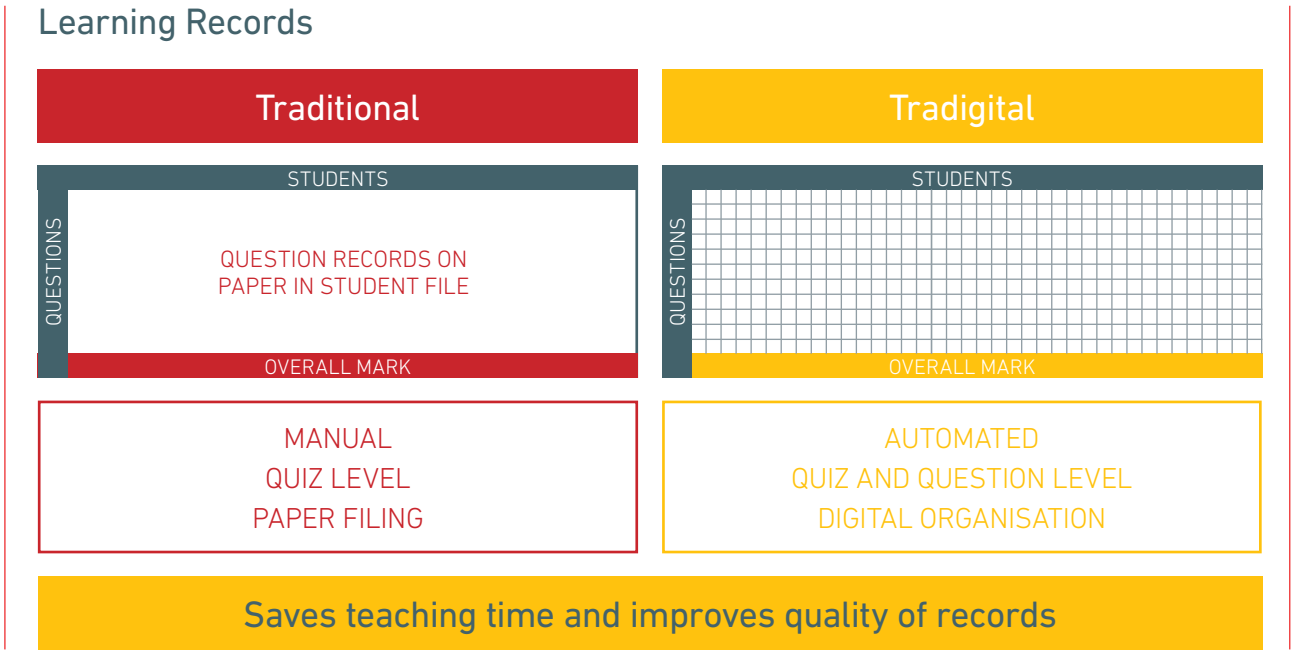
In fact, digital solutions have a couple of powerful advantages in the provision of feedback:

1. **IMMEDIACY**
   Rather than having to wait until a piece of work is submitted, marked and then returned with feedback, students can immediately access an explanation on the questions they have just been considering. What's more, they are then challenged to apply this explanation in the very next question they face within an assessment.

2. **PERSONALISED DELIVERY**
   Students can access only the feedback they personally require. This is in contrast to feedback delivered at the front of a classroom to an entire class on specific aspects, which may be more relevant to some students than others.

ACCESSIBLE DATA

One of the major step-changes within the education sector over the last couple of decades has been the increase in importance placed upon using data.



Traditional assessment activities do support the collection of data, however this is often at a time-cost. Teachers need to collect marks within their gradebook before manually keying these in to the relevant software.

Digital learning activities automatically collect student data without any teacher input. Not only that, the data collected can be richer, providing opportunities for more in-depth interrogation and analysis. For example, data can not only be provided for overall assessment outcomes, but also question-by-question analysis for individual students, or classes (or schools) as a whole.

Not only is the depth of data available important, so is the timeliness of its provision. Digital solutions are able to give teachers access to student activity data in real-time, allowing them to make use of it at the moment an intervention is likely to be most effective. The simplest example to comprehend is completion data. Teachers can check the software just before a class is about to start and view which of their students have completed the work they were directed to do and, more importantly, which haven't. They can manage non-completion of work efficiently. This is juxtaposed with traditional paper-based homework. Teachers may eat up valuable class time collecting in papers and ascertaining which students have not completed. This needs to occur, amid the obfuscation of student excuses and protests, before managing non-completion can begin.

> The key is that digital solution providers understand the needs of teachers and provide data in an accessible and informative way. The hard graft of analysing the data should be performed by software, allowing teachers easy access to its conclusions, empowering them to make informed interventions.

How can adapting the teaching delivery model allow schools to get the most out of their digital solutions?

Digital solutions which include the three key properties of depth of content, feedback and accessible data can earn the trust of teachers and schools. Once this has been garnered, it is possible to consider how they might be optimally used.

Improving Teacher Productivity

MANUAL	AUTOMATED
Create or source exercises	
Print paper copies	
Issue instructions/distribute to students	Issue instructions
Collect completed assessments	
Mark and provide feedback	
Record marks	
Input marks in school system	Copy/paste marks in school system
Return marked assessments	
Students file exercise	
Manage non-completions	Manage non-completions
Review overall outcomes and intervene	Review overall outcomes and intervene
'FAT'	'LEAN'

Intuitively, the largest benefits will be derived by schools who utilise digital resources in a structured way. One effective approach is to rely upon a digital service to take the strain of knowledge assessment away from teachers. No matter what subject is being taught, the lowest level skill required by students is subject knowledge. This knowledge base needs to be developed before higher-level skills can be developed.

Automated assessments can streamline the process of knowledge assessment significantly. Teachers no longer have to expend effort sourcing or creating exercises, or arranging printing/photocopying. Precious class time is not consumed through handing-out and collecting work. Vitally, marking time that would be used for marking knowledge assessment can be directed to other activities, where teachers can add more value.

This is the bullseye. Teacher time is released to focus on higher-level skills, like essay-writing, effective analysis and problem-solving. Alternatively, you could look at it another way. This streamlined process allows the opportunity for teachers to manage their students to achieve a far higher level of knowledge assessment than they could under a traditional approach.

Knowledge assessment via a digital solution is streamlined, however, teacher involvement is still vital. Some schools engage with digital solutions by making their students aware that they can access them and leaving it at that. This is an 'Arm's Length' approach. Schools should expect a similar reaction to introducing the policy that all homework is voluntary. Completion will be low and inconsistent. Many students will engage in a low level of activity.

Teacher engagement is required to drive student activity. Actively setting digital activities, and managing its completion, is essential to the process. The next step-up is to make use of the data student activity generates to inform interventions. Integrating it within a scheme of work, such that digital knowledge assessment is regular and relevant to in-class activity, is the holy grail.

Teachers are assisted in the management of activity by the student accountability digital solutions provide. If teachers deal with the management of digital activities as seriously as they deal with the management of traditional exercises, students will quickly understand that the availability of excuses for non-completion is restricted. Students can access their service at any time, from any device, with no chance of it being eaten by the dog or 'lost' on the train. Uber-keen teachers may want to check up on completion data before the student deadline and issue reminders.

	OLD BASIS	NEW BASIS
Approach	"Arm's Length"	"Hands On"
Embedded in core activities	No	Yes
Participation	Optional	Mandatory
Teaching benefits	Low	High
Student benefits	Minimal	High

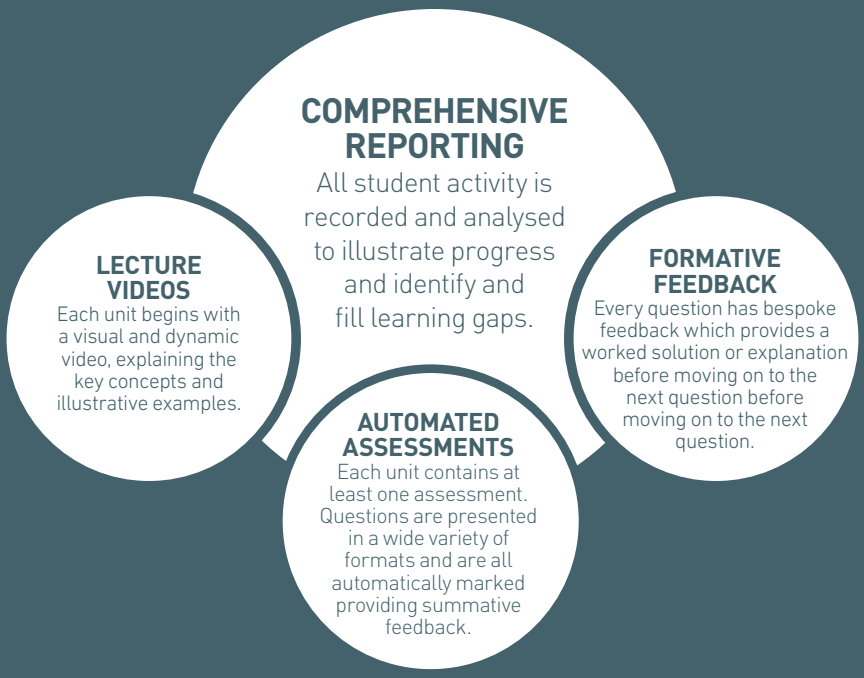
Schools which understand the importance of integrating digital solutions, and have teachers willing to engage with them on a "Hands On" basis, will be able to derive huge benefits.

EzyEducation provides comprehensive
teacher-centric digital resources for:

GCSE Maths
GCSE Science
A Level Economics
A Level Business

Thousands upon thousands of carefully structured assessment questions are all accompanied by individual, bespoke feedback. Students also have access to topic-by-topic uber-visual lecture videos – perfect for flipped classrooms or organised exam revision.

All courses are delivered within a platform which records and analyses all student activity, designed with teachers in mind.



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